



**The Library
of Computer
& Information Sciences**

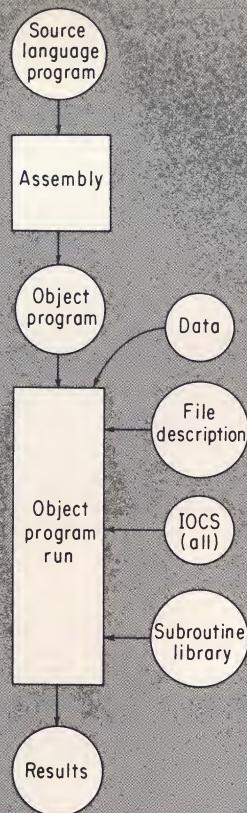
Front and Brown Streets
Riverside, New Jersey 08075

Address Correction Requested



IMPORTANT:

**DATED
MATERIALS
ENCLOSED**



Contents

1. Introduction
2. Fundamentals
3. Programming Concepts
4. Software Introduced
5. Assembly
6. Macrocommands
7. Assembler Subroutines
8. Assembler Refinement
9. IOCS-Preprocessor, Buffer Subsystem
10. IOCS Operating Commands
11. The FOREMAN
12. Service Systems
13. Supervisors
14. The Loader and Allocator—LOAD

Appendices

- A. References
- B. FLAP Directives
- C. FLAP Directives (Alphabetic)
- D. Cross Reference Routines by Function

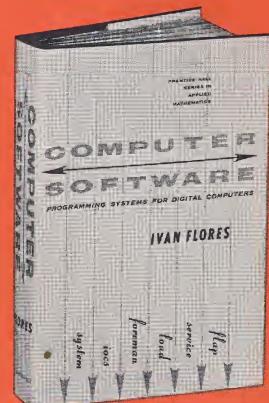
Alternate Selection:

COMPUTER SOFTWARE:
Programming Systems for
Digital Computers
 by Ivan Flores

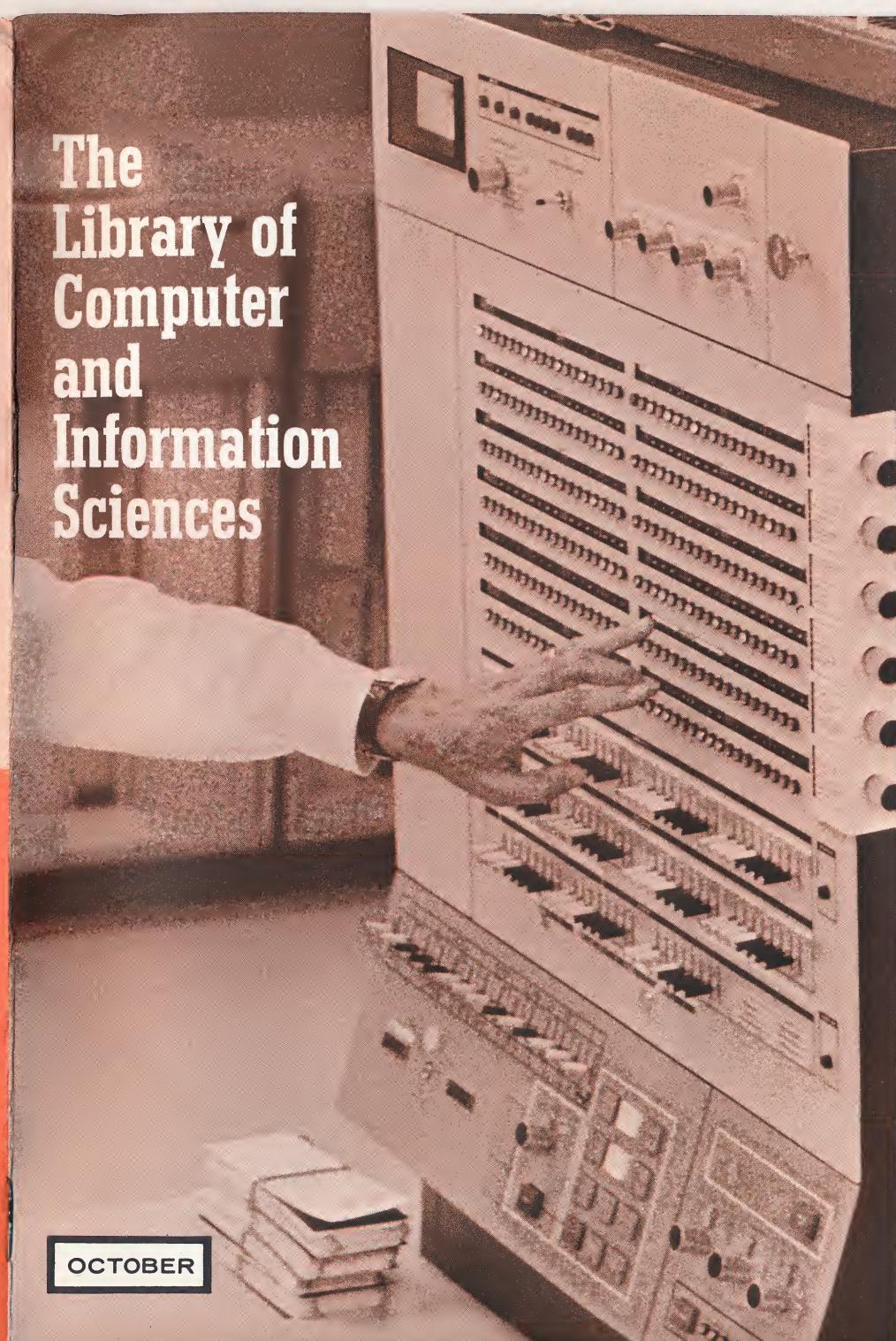
Retail Price \$17.30

MEMBER'S PRICE \$11.90

Plus one bonus credit toward the four required for your next free Bonus Book



The Library of Computer and Information Sciences



OCTOBER

The Main Selection:

CONVERSATIONAL COMPUTERS

Edited by William D. Orr



The "computer revolution" has come upon us so swiftly that relatively few volumes have paused to survey some of the newest computer phenomena. In this month's Main Selection, **CONVERSATIONAL COMPUTERS**, William D. Orr, head of a firm of communications consultants, has put together a perceptive work that takes a wide-ranging look at pivotal new developments—in computing machines, computing techniques, programming languages, and strategies—all in anticipation of the time in the not-too-distant future when "personal computers" will be as common as personal passenger cars.

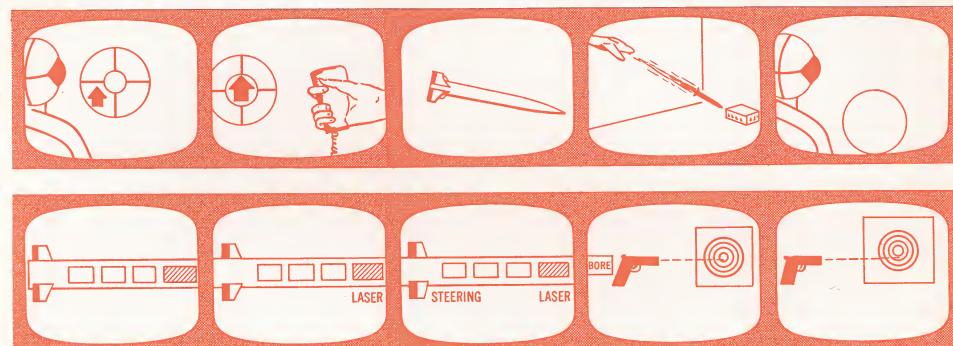
CONVERSATIONAL COMPUTERS takes its title from the author's thesis that "conversational interaction with computers is a major new phenomenon in its own right, not simply another "application" of computers. According to the editor of this provocative new volume, it ranks with such generic concepts as "data processing" and "automation."

"Conversational" is simply an all-inclusive term for what specialists variously refer to as time-sharing interactive systems, responsive modes of usage, reactive typewriters, or on-line problem solving. In contrast to automatic systems in which man feeds information into the machine, in conversational systems the machine searches, computes, and displays information until the needs of the human user are satisfied.

As befits a dramatic new concept, the reader is advised, while reading **CONVERSATIONAL COMPUTERS**, to think of the computer as just another piece of equipment. One need not be concerned about word-lengths, compilers, dynamic relocation, access times, switching techniques—or even where the punched cards went. And it is as pointless to inquire *what* conversational computers will be used for as it would be to ask what places one can drive to in an automobile or what letters one can compose on a typewriter.

The introductory section of **CONVERSATIONAL COMPUTERS** lays the conceptual groundwork for the selections that follow, with perceptive contributions by such distinguished authors as J. C. R. Licklider, John McCarthy, and Vannevar Bush.

• **Problem Solving Modes** deals with on-line systems in which the user manipulates the computing machinery as an intellectual tool. Of especial interest will be J. C. Shaw's contribution on JOSS (the Johnniac Open-Shop System) which monitors 10 typewriters and serves up to eight users concurrently. JOSS was developed because the scientists, mathematicians, and engineers at The RAND Corporation were not using computers in their daily work quite as much as had been hoped. JOSS is a masterpiece of elegant simplicity; children have even learned how to use it after only a few minutes' instruction.



One senior electronics engineer said:

"JOSS is becoming essential to our output like paper, or coffee. It speeds up calculations; makes it easy to try experiments. It is the greatest when it works. I have heard it compared favorably to beer and referred to as RAND's most important fringe benefit. People adjust their lives to JOSS. . . . No use coming to RAND before 10:00 a.m. when JOSS arrives; in fact noon or after 5:00 p.m. is a better time, JOSS is less busy. When JOSS starts typing answers, the titillating pleasure is equalled only by the ensuing anguish when JOSS breaks off into gibberish or goes away commanding your program to oblivion. We can hardly live with JOSS, but we can't live without it. We're hooked."

• **Instructional Modes** examines systems in which the relationship between the user and computer program is the reverse of what it is in on-line problem solving. In such systems, the *computer* is always in charge of the situation. Leonard C. Silvern's contribution on Computer-Assisted Instruction (CAI) is a rigorous but nontechnical presentation of a totally new teaching concept made economically feasible by time-sharing.

• **Retrieval and Query Modes** deals with still another kind of relationship between user, computer, and stored information. In this mode, the object of the interaction is to find and fetch specific units known or believed to be (or hoped to be) in storage. Among the examples described is System Development Corporation's SYNTHEX, used by, among others, the Los Angeles Police Department in the identification of criminals by cross-correlation of information in crime reports.

• **Graphical Conversation Modes** covers a subject with wide-reaching implications for the future. Several distinguished contributors here describe computer-augmented design experimentation which now makes it possible to do with computers the graphic work done by draftsmen and illustrators.

• **Toward the Computer Utility** treats the logical extension of time-sharing and conversational applications to large-scale information networks. Of special interest will be the FCC's "Notice of Inquiry," a document widely discussed by computer people for its treatment of the underlying issues, although not easily available.

• **Psychological and Social Implications** explores the impact of the coming computer utilities and concludes that—in spite of the hidden threats to privacy—the consequences of the new technology will be beneficial in the long run.

CONVERSATIONAL COMPUTERS will be required reading for those who want a glimpse of the exciting new world of personal computer usage that awaits us. Automobiles have given man a mobility that far exceeds what evolution has provided; computers may conceivably be a comparable evolutionary step with regard to man's intellect. Who knows what exciting flights of imagination lie ahead when the human mind is freed of the routine mental "housekeeping" chores associated with thinking?

Among the Contributors:

Charles W. Adams • Paul Baran • Richard H. Bolt • Vannevar Bush • Federal Communications Commission • Merrill M. Flood • Joseph J. Gal • Edwin L. Jacks • John G. Kemeny • Robert S. Lee • J. C. R. Licklider • John McCarthy • Ulric Neisser • William D. Orr and the Staff of Bolt Beranek and Newman, Inc. • John E. Pfeiffer • Melvin W. Pirtle • Gerard Salton • Scott R. Schmedel • J. C. Shaw • Leonard C. Silvern • Robert F. Simmons • Frederick B. Thompson

CONTENTS

I. The Vision

1. Man-Computer Symbiosis
J. C. R. Licklider
2. Time-Sharing Computer Systems
John McCarthy
3. As We May Think
Vannevar Bush

II. Problem-Solving Modes

4. JOSS: Experience with an Experimental Computing Service for Users at Remote Consoles
J. C. Shaw
5. The Culler-Fried Approach to On-Line Computing
William D. Orr and the Staff of Bolt Beranek and Newman, Inc.
6. Man-Machine Interactive Systems and Their Application to Financial Analysis
Joseph J. Gal

III. Instructional Modes

7. CAI in an Expanding Universe of Educational Methodology
Leonard C. Silvern
8. Computer-Assisted Socratic Instruction
Richard H. Bolt
9. HELP
Melvin W. Pirtle

IV. Retrieval and Query Modes

10. Progress in Automatic Information Retrieval
Gerard Salton
11. SYNTHEX
Robert F. Simmons
12. DEACON-Type Query Systems
Frederick B. Thompson

V. Graphical Conversation Modes

13. Electronic Sketching
Scott R. Schmedel
14. The Robot Draftsman
John E. Pfeiffer
15. A Laboratory for the Study of Graphical Man-Machine Communication
Edwin L. Jacks

VI. Toward the Computer Utility

16. Responsive Time-Shared Computing in Business
Charles W. Adams
17. Commercial Information-Processing Networks
Merrill M. Flood
18. Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities
Federal Communications Commission

VII. Psychological and Social Implications

19. The Computer at Dartmouth
John G. Kemeny
20. Does the Interconnected Computer Network Pose a Hidden Threat of Invasion of Privacy?
Paul Baran
21. Computers as Tools and Metaphors
Ulric Neisser
22. The Computer and the Concept of Man
Robert S. Lee

The Main Selection:

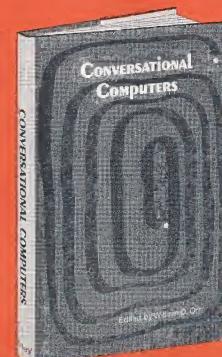
CONVERSATIONAL COMPUTERS

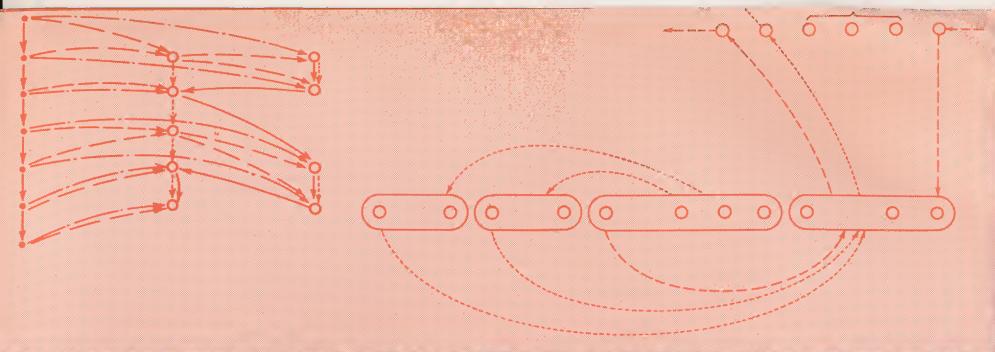
Edited by William D. Orr

Retail Price \$8.95

MEMBER'S PRICE \$6.95

Plus one bonus credit toward the four required for your next free Bonus Book





Alternate Selection:

COMPUTER SOFTWARE: Programming Systems for Digital Computers

by Ivan Flores

This month's Alternate Selection, **COMPUTER SOFTWARE: PROGRAMMING SYSTEMS FOR DIGITAL COMPUTERS**, by Ivan Flores, is an unusually practical and fact-filled handbook of the growing techniques and applications of computer software. Specifically designed for programmers who want to know more about software, Dr. Flores' authoritative book can be read and used profitably by anyone with a basic knowledge of programming and even the briefest acquaintanceship with or access to computers.

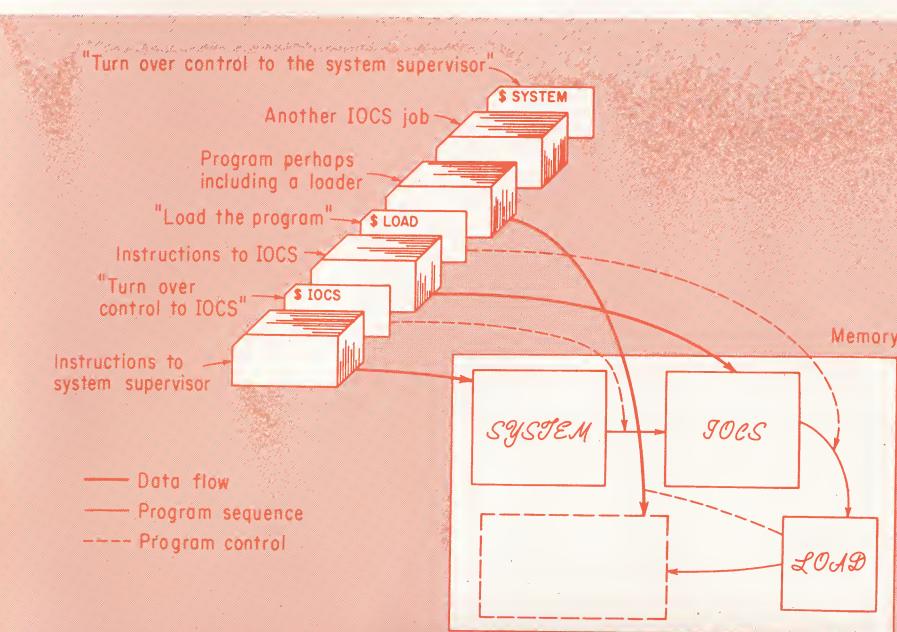
Dr. Flores begins with a basic review of the fundamental structure of the computer and its subsystems, exploring indexing and the various methods of addressing computers. With a brief but solid foundation in computer fundamentals established, the author then turns his attention to a comprehensive presentation of programming concepts. He reviews for the reader the principles of the construction of subroutines (a generalized sequence of instructions designed to perform a particular function when provided with specific problem data) and loops (the repetition of a sequence or instruction) and devises the highly utilitarian linkage and calling-system conventions which are a feature of this book.

Lists are important to all branches of programming. In **COMPUTER SOFTWARE**, Dr. Flores has developed a unique symbology for presenting list concepts. Because buffering (isolating circuits) is unavoidable in large computers with simultaneous IO (Input-Output) device operation, the author describes various systems leading up to the buffer pool, the most advanced concept required for a complete Input-Output Control System (IOCS).

It has been estimated that 99 per cent of translation for computer operation uses assemblers (a program equipping a computer to accept instructions in other than machine language) and that more than 20 per cent of average computer time is spent in translation. In his treatment of this highly important function, the author describes and analyzes systems ranging from the simplest to the most complete. Mnemonics are the kernel of any assembly language: the author uses the acronym FLAP (for FLores Assembly Program) to describe his system, which furnishes the various types of assembly commands used in the accompanying exercises—an important feature of the book making it especially useful for self-tuition.

Dr. Flores also describes a hypothetical automatic computer (FLAPJAC) with the addressing and indexing characteristics for his assembly language. This computer uses a 36-bit word—a convenient size for both alphabetic and numeric information.

The author of **COMPUTER SOFTWARE** is uniquely qualified to prepare such a work. A consultant in computer design and Associate Professor of Electrical Engineering at Stevens Institute of Technology, Dr. Flores has served as an advisor to manufacturers whose products range from small, special-purpose devices to large, general-purpose computers. He is also the author of *The Logic of Computer Arithmetic* and *Computer Programming*.



The International Reference Day Book 1969



A special selection of general interest

Your Appointment Diary, Expense Record, U.S. and International Reference, and World Atlas in full color . . . all combined in one stunning, convenient volume.

Your Appointment Diary and Expense Record 72-Page International Reference Section Full Color World Atlas
— combined in one stunning, convenient volume

The International Reference Day Book 1969

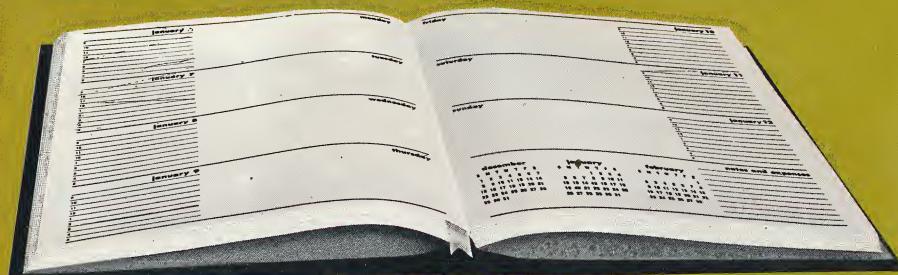
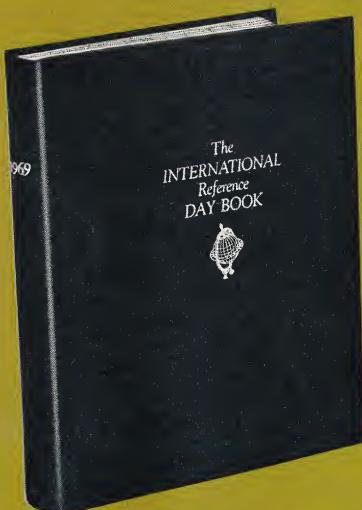
THE INTERNATIONAL REFERENCE DAY BOOK was created for the busy person; it will serve you in many ways.

As an Appointment Diary, it opens flat on your desk or telephone table, allowing you to see your entire week's schedule at a glance. Printed in two colors on special non-glare, creamy-smooth paper, the DAY Book provides space for your hour-by-hour appointments each day of the week, along with ample room

for daily reminders, telephone numbers, and special engagements. In addition to your full week's appointments, you will find a three-month calendar, and space for notes and expenses — your permanent record for income tax purposes.

A special feature of the DAY Book is a red satin marker ribbon (cut on the slant so it won't fray). Never again will you have to thumb through an appointment book while someone is waiting on the phone to find out if you're free at a certain time; the ribbon helps you find the current week instantly.

The Diary Section begins with November of 1968, and runs through 1969 and well into January, 1970; your transition from one year's Diary to the next will be comfortably unhurried and orderly. Here, too, you will find the major national and religious holidays, as well as those days you won't want to forget, such as St. Valentine's Day, Mother's Day, Father's Day, and Election Day.



THE INTERNATIONAL REFERENCE DAY Book 1969 puts you in touch with the entire world, giving you thousands of useful, fascinating facts and statistics.

The 72-page Reference Section is conveniently tab-indexed for fingertip ease in finding and turning to the section you want. You will find a country-by-country analysis of population, government, principal industries, exports and imports, languages and religions, capital cities, and the names of the main political parties and leaders.

Here are charts showing the major currency units of the world and their value in relation to the dollar, U.S. foreign travel regulations (including travel to the Soviet Union), and a listing of principal international organizations.

The *Investor's Guide* contains information on stock exchange rules, minimum commissions on stocks, margin requirements from 1934 to the present, and profitability of major U.S. industries. Also listed are the 100 largest U.S. Government defense contractors; it is interesting to note that Johns Hopkins University and the Massachusetts Institute of Technology are larger defense contractors than Dow Chemical.

A brand new feature — and exclusive with the DAY Book — is a *World Computer Census*, showing the number of computer installations in the major countries of the world. How many are there in Russia? In Israel? In Red China? You'll find out in your 1969 INTERNATIONAL REFERENCE DAY Book.

The gourmet will find an *International Dictionary of Drinks* (Absinthe to Zubrovka Vodka) and an *International Dictionary of Cheeses* (Appenzell to La Vache Qui Rit). Here, too, he'll find *A Decade of Wines: A Vintage Chart, 1955-1964*.

The Reference Section is printed in two colors; the large, clear type face and tab indexing make needed information easy to find and understand. And it provides fascinating reading for the casual browser.

The International Reference Day Book 1969 Features

WORLD TRENDS

(country by country)

Growth Rates & Living Standards
World Population
World Trade

WORLD ORGANIZATIONS

FOREIGN COUNTRIES

Political
Form of Government
Principal Parties and Leaders
General
Principal Languages and Religions
Area
Capital
Other Principal Cities
Economic
Major Products, Imports, Exports
Trading Partners
Government Income & Expenditure
Gold Reserves

WORLD EXPORTS OF MANUFACTURED GOODS

INTERNATIONAL CURRENCY EXCHANGE RATES

THE UNITED STATES OF AMERICA

Executive, Legislative and Judicial Branches
Population, Employment, Earnings
Internal and External Economy
The Fifty States
Economic Development and Planning Agencies
Growth, Finances, Tax Rates, Crime

FOREIGN DIPLOMATS AND COMMERCIAL REPRESENTATIVES TO THE U.S.A.

U.S. REPRESENTATIVES ABROAD

AEROSPACE AND TECHNOLOGY

World Computer Installation
Census, Country by Country
Computer Manufacturers'
Share of Selected World Markets

Chronology of Manned Space Flight
World Airlines
Miles and Passengers Flown
Numbers and Makes of Aircraft in Use

FORMS OF ADDRESS AND PROTOCOL CHART

INVESTOR'S GUIDE

Stock Exchange Rules
Patterns in Stock Prices
Bond and Stock Yields
Largest U.S. and Foreign Industrial Corporations
Profitability of Major U.S. Corporations
100 Largest U.S. Government Defense Contractors

THE INTERNATIONAL DICTIONARY OF DRINKS

THE INTERNATIONAL DICTIONARY OF CHEESES

A DECADE OF WINES: A VINTAGE CHART 1955-1964

1969 APPOINTMENT DIARY AND EXPENSE RECORD

WORLD TIME ZONE MAP AND WORLD TIME COMPUTER

AIR MILEAGE AND JET FLYING TIME CHART BETWEEN CITIES OF THE WORLD

WORLD MAPS (in full color)



The International Reference Day Book 1969

Deluxe Kid-Soft Binding (the look and feel of leather, but stronger and more soil-resistant)

23 Carat Gold Stamping

Elegant Maroon and Black Gift Box with Gold Stamping
Convenient Fingertip Tab-Indexing of All Reference Material
Red Satin Marker Ribbon (cut on the slant so it won't fray)

Superbly Printed in Two Colors Throughout
on Heavy, Creamy-Smooth Monadnock Caress Paper

A Generous 8 1/2" x 10 1/2" Volume
(It lies flat when opened to any page)
Endpapers of Antiqued World Maps

List Price \$13.00

Member's Price \$9.95

Plus one bonus credit toward the four required for your free Bonus Book



THE INTERNATIONAL REFERENCE DAY Book 1969, Special Selection, may be ordered in addition to or instead of the Main Selection.

Enroll new members in The Library of Computer and Information Sciences and receive **FREE copies of books from this list of Recent Selections**

Do you have friends or colleagues who would enjoy the many benefits of membership in The Library of Computer and Information Sciences? Why not tell them about the wide range of selections, books on systems design, operations research, information retrieval, programming, and many other topics, all available at reduced Member's prices—plus free Bonus Books. For every member you enroll, we will send you one free book from this list of Recent Selections. Of course, you may enroll as many members as you wish, simply by filling in the spaces below. To receive your free books, return this form, with the new members' signatures, to The Library of Computer and Information Sciences, Front and Brown Streets, Riverside, New Jersey 08075.

Please enroll the new member(s) listed below. Send to each, as a free Membership Gift, the volume listed—any book described in this list of Recent Selections. Also send the first Membership Selection indicated—any of the current Selections or any of the volumes in this list of Recent Selections. SEND ME MY FREE BOOKS AS SHOWN—ONE FOR EACH NEW MEMBER I HAVE ENROLLED.*

**Except those designated "Not available as free books."*

New Member

Address

City

State Zip

Free Book

First Selection

New Member's signature

New Member

Address

City

State Zip

Free Book

First Selection

New Member's signature

New Member

Address

City

State Zip

Free Book

First Selection

New Member's signature

My Name

Account Number

Address

City

State

Send as my Free Book(s)

(1)

(2)

(3)

Use separate sheet for additional names.

RECENT SELECTIONS of The Library of Computer and Information Sciences



Any of the Selections described in this brochure may be ordered by members of The Library of Computer and Information Sciences, in addition to or instead of the current Selections. All are available at reduced Member's Prices. One Bonus Book Credit is given for each Selection purchased. To order, please indicate the code numbers of the books you have chosen on the enclosed Order Card.

***Digital Processing: A System Orientation** (42270)
By Louise Schultz
A highly readable survey of the principles, techniques, and applications of digital processing in linguistic, rather than symbolic, terms. Emphasizes fundamental concepts and functions of both devices and programs. *Retail price \$14.35*
Member's price \$8.95

***Mathematical Methods for Digital Computers, Vol. II** (60960)
Edited by Anthony Ralston and Herbert S. Wilf
Covers the breathtaking advances in the field of numerical analysis since the publication of Volume I. Topics include: programming languages, the quotient-difference algorithm, numerical linear algebra, numerical quadrature, numerical solution of equations, and much more. *Retail price \$11.95*
Member's price \$8.50

Probability Theory and Its Applications, Volume 1, Third Edition (70350)
By William Feller
This newly revised edition of the recognized classic develops probability theory as a mathematical discipline and, at the same time, illustrates a broad variety of practical problems and the modern techniques for solving them. A self-contained introductory course. *Retail price \$10.95*
Member's price \$7.95

***Automatic Data Processing** (35450)
By Elias M. Awad and the Data Processing Management Association
Complete introduction to the principles and procedures of automatic data processing—representing the combined efforts of the leading computer managers and a top writer-educator in the field. *Retail price \$11.95*
Member's price \$7.50

***Developing Computer-Based Information Systems** (42060)
By Perry E. Rosove
A comprehensive study of the new information technology. Examines development of systems—including requirements, design, production, installation and operation—and emphasizes the typical management problems likely to be encountered in their implementation. An intensely practical book. *Retail price \$14.95*
Member's price \$10.95

***The Analysis of Information Systems** (33400)
By Charles T. Meadow
Here is a careful study of the languages of information retrieval, the organization of records and files, and the machine processing of stored information. Supplies the background needed for participation in the analysis and design of information-handling systems and for understanding the literature in the field. *Retail price \$11.95*
Member's price \$8.25

***Display Systems Engineering** (42370)
Edited by H. R. Luxenberg and R. L. Kuehn
A thorough exploration of the devices and systems of recording and displaying computer-based information. Develops theoretical foundations of all display systems and discusses their technological applications. Includes many illustrations and diagrams. *Retail price \$16.50*
Member's price \$11.95

Introduction to Computing (56300)
By T. E. Hull
Thoroughly explains the principles and applications of computing. A highly useful new guide to algorithms, stored-program computers, and programming techniques, it focuses on Fortran IV—one of the most widely used algorithmic languages in computing. *Retail price \$10.60*
Member's price \$7.75

Introduction to Computational Linguistics (56490)
By David G. Hays
A comprehensive work covering computer applications to linguistics. Includes discussions of storage and control, text processing, transformational parsing—and applications of these processes to linguistic research, publication systems, information dissemination and retrieval, and translation. *Retail price \$9.75*
Member's price \$7.50

***Electronic Information Handling** (44100)
Edited by Allen Kent and Orrin E. Taulbee
A complete overview of the rapidly expanding field of information handling and retrieval. Among the topics covered: interpreting signals and numerical information, future hardware for electronic information-handling systems. *Retail price \$11.00*
Member's price \$7.95

The Impact of Computers on Management (55140)
Edited by Charles A. Myers
Presents the latest thinking and research on the relationship between man and machine and the roles of both in industrial organization, stressing the implications of computers for managerial work. Based on a conference of experts at the Alfred P. Sloan School of Management of Massachusetts Institute of Technology. *Retail price \$10.00*
Member's price \$7.50

***Natural Language and the Computer** (63840)
Edited by Paul L. Garvin
The first book to provide a comprehensive survey of the emerging field of language data processing (by "language" is meant a natural language such as English or Russian, and not an artificial language such as ALGOL, FORTRAN, or MAD). It not only covers all aspects of the computer processing of natural-language data, but also gives extensive background material in linguistics, mathematics and computation. *Retail price \$13.75*
Member's price \$9.25

***Programming Systems and Languages** (70790)
Edited by Saul Rosen
A comprehensive, detailed review of computer software that brings together the most authoritative articles from computer journals and proceedings. Covers the entire history of programming systems and languages. So up-to-date that it treats areas still being developed and tested. *Retail price \$12.50*
Member's price \$8.95

See special offer on reverse side.

Introduction to Dynamic Programming (56470)
By George L. Nemhauser
A volume of unique value to those concerned with optimization problems. Analyzes in order elementary and complex systems; emphasizes when to use dynamic programming and how to do the computations; provides numerous flow charts and exercises. *Retail price \$7.95*
Member's price \$6.50

Digital Computer Programming (42190)
By Peter A. Stark
Uniquely practical introduction to the programmer's art, with step-by-step solutions to hundreds of typical computer problems. Covers computer characteristics, applications, techniques, and languages. *Retail price \$9.95*
Member's price \$7.50

***Electronic Digital Systems** (44070)
By R. K. Richards
A pioneering exposition of the fundamentals, concepts, and ideas pertinent to a wide range of digital systems. Arranged so that the reader is provided with ready access to every important scheme devised to meet the requirements of digital systems, including the most thorough presentation of the stored-program concept yet published. *Retail price \$15.95*
Member's price \$10.95

***Integrated Data Processing Systems** (55660)
By E. Jerome McCarthy and J. A. McCarthy. Edited by Durward Humes
A comprehensive, jargon-free book "aimed at those who want to understand *in depth* how data processing machines can help analyze business information. It is well organized, highly readable." — Elias M. Awad, De Paul University *Retail price \$8.95*
Member's price \$6.95

Elements of Data Processing Mathematics (41660)
By W. T. Price and M. Miller
Concise, comprehensive exposition of the science of mathematics as it is applied in computer programming and data processing. Includes matrices, linear programming, series and iterative methods. Hundreds of challenging exercises. An ideal volume for self-instruction. *Retail price \$10.50*
Member's price \$7.75